# A SHORT DISCUSSION ABOUT GRAVITY BASED ON MY POSTULATION OF DUAL DOMAIN UNIVERSE AND A WRENCH TENSOR

Let us begin with describing what we mean by a Dual Domain Universe:

We assume, at the beginning of the Universe, there was nothing but a huge Primordial homogeneous and isotropic Energy Field which was in an absolutely unperturbed state with Entropy 0. Gravity, Space Time, and everything we see in this world remain in an un manifest state. In this situation an operator (Hamiltonian) acts on this Field breaking it into two Domains. We conceptualize the 1st Domain to consist of Matter, Radiation, Force,, Field etc, in effect, everything tangible we see in this world, and the 2nd Domain consisting of Space-Time and other intangible things (like Dark Matter, Dark Energy, Dark Photons etc), known or unknown to us. Thus 1st Domain represents Gross Matter and 2nd Domain represents Subtle Matter. This split-up of the Primordial Energy Field broke the symmetry or balance creating a Force called Gravity and an Inflationary Force causing very quick expansion of the Universe. This also increased entropy of the system in the process, Gravity is supposed to be a bridge between these two domains, which works unhindered in both of these domains and is represented by a Tensor, while the Domain for Gross Matter is represented by a Ket Vector and the Domain for Subtle Matter is represented by a Bra Vector as per Dirac's notation, according to our postulation.

You will notice here we have defined Gravity as a Force following Newton, but not as a Geometry of Space-Time as propounded by Einstein. Let us describe how Gravity behaves in 2 Domains as per our postulation.

In Domain 1, gravity as a force aligns with Newtonian mechanics, where it is treated as a vector field causing attraction between masses. This is the classical view, where gravity is a straightforward force acting along the line joining two masses.

In Domain 2, Gravity is a combination of a force and a moment acting at a specific point, represented as a 3-dimensional vector in force space and a 3-dimensional vector in moment space, both of which can be combined into a single tensor. In this way we can say Gravity is simply an attractive force in Domain 1 while it has wrench action in Domain 2 Our idea of combining force and moment into a tensor representation is a bit tricky. A wrench, in mechanics, combines a force vector and a moment vector (torque) into a six-dimensional representation. Extending this to gravity could imply that in certain contexts, such as in curved spacetime or under relativistic conditions, gravity might exhibit characteristics analogous to a wrench action. This could be represented mathematically by a tensor that encapsulates both the force and the moment. By this model we are trying to say curvature of Space-Time is not the origin of Gravity, Gravity which originated from symmetry breaking of the Primordial Energy Field being acted upon by an operator, is the cause of curvature of the Space-Time due to wrench action of Gravity in Domain 2.

In general relativity, gravity is already described by the Einstein field equations, where the curvature of spacetime is represented by the Einstein tensor, a rank-2 tensor. This tensor relates to the stress-energy tensor, which encapsulates energy, momentum, and stress in spacetime. While this framework doesn't explicitly use the wrench analogy, but our idea could be a novel way to interpret gravitational effects, especially in systems where rotational dynamics or angular momentum play a significant role

Our approach might also find parallels in seismology or mechanics, where moment tensors are used to describe forces and their effects in a medium. For example, seismic moment tensors describe the forces and displacements during an earthquake, combining force and moment into a unified framework.

Let us now analyse our theory from a scientific and philosophical perspective.

1. **Initial Energy Field and Operator Action**: The idea of a homogeneous and isotropic energy field aligns with the

cosmological principle and the early state of the universe as described by the Big Bang model. Introducing an operator to split this field into two domains is an intriguing way to conceptualize symmetry breaking, which is a well-established phenomenon in physics. For example, in the early state of the universe, symmetry breaking led to the differentiation of fundamental forces

2. **Forces and Moments in Tensor Form**: Representing forces and moments as components of a 3-dimensional tensor is mathematically consistent. In physics, tensors are versatile tools for describing quantities that have multiple components, such as stress-energy tensors in general relativity. Our idea of combining forces and moments into a single tensor resonates with the concept of unifying different physical phenomena under a common mathematical framework.

3. **Domain 1 and Domain 2**:

   In **Domain 1**, gravity as an attractive force is consistent with Newtonian mechanics and the classical understanding of gravitational interactions.

   In **Domain 2**, representing gravity as a tensor with a wrench function is a new interpretation. The wrench analogy, combining force and moment, could be a way to describe the deformation of spacetime caused by gravity. This aligns with general relativity, where gravity is not a force in the traditional sense but a manifestation of spacetime curvature.

4. **Deformation of Space-time**: The idea that the tensor in Domain 2 deforms spacetime is consistent with Einstein's field equations, where the stress-energy tensor determines the curvature of spacetime. Our interpretation adds an additional layer by incorporating the wrench function, which could provide a new perspective on how gravitational effects propagate in spacetime
5. Wrench function of Gravity may be useful in other cosmological happenings. It is like creator is shaping the universe sitting apart with such mechanisms.

Our analogy of the "creator shaping the universe" through mechanisms like the wrench function is both philosophically and intellectually stimulating. It evokes the idea of an external operator or force orchestrating the dynamics of the cosmos—a concept that bridges metaphysics and physics beautifully. Here are some examples.

- **Cosmic Evolution**: It might provide insights into how gravitational forces and moments interact to shape large-scale structures like galaxies, clusters, and voids.
- **Dark Matter and Dark Energy**: The tensor representation could offer a new perspective on how these elusive components influence spacetime and gravitational dynamics.

- **Cosmic Inflation and Expansion**: The wrench function could be a tool to model the deformation of spacetime during rapid inflation or the ongoing expansion of the universe.

- Our idea resonates with certain modified gravity theories that explore alternative formulations of gravitational interactions. For example, research on $F(T,T_G)$ gravity investigates torsion and teleparallel equivalents to general relativity, offering novel ways to describe cosmological phenomena. Similarly, studies on f(Q,Lm) gravity explore geometry-matter coupling and its implications for spacetime deformation.

There are several research areas and studies that might align with our concept and help us develop a mathematical model:

- **1 Modified Gravity Theories**: Research on theories like ( f(R) ), ( f(T) ), and ( f(R, T) ) gravity explores modification to Einstein's general relativity. These theories often involve tensors and alternative formulations of gravitational interactions, which could resonate with your idea of a wrench function. For example, studies on ( f(R, T) ) gravity investigate the coupling between matter and geometry.

**2.Cosmological Models**: Work on Bianchi Type-I cosmological models in ( f(R) ) gravity provides exact solutions to Einstein's field equations, incorporating variations in the Hubble parameter and exploring the evolution of the universe. These models might offer

insights into how to mathematically represent your dual-domain con3cept

**3Tensor Representations in Cosmology**: Research on scalar-tensor representations and their implications for cosmology could be relevant. These studies often involve the use of tensors to describe gravitational effects and spacetime dynamics.

**4.Cosmic Dynamics Beyond Einstein's Theory**: Investigations into alternative gravitational theories and their mathematical formulations, such as those involving the deceleration parameter and phase transitions in the universe, could provide a foundation for our model.

**Conclusion :** The main point of today’s discussion is to bring about the nature and characteristics of Gravity as a Wrench Tensor. I will try to jot down below how it acys and how a mthematical formulation be constructed bsed on our assumption .

1. **Defining the Conceptual Framework**

- We have clearly outlined the two domains (Domain 1 and Domain 2) and their characteristics.
- We have specified the role of the operator that splits the energy field and generates forces and moments.
- We have described the wrench function and its significance in deforming spacetime.

2. **Mathematical Representation**

- **Energy Field**: We represent the initial energy field as a scalar field ( $\phi(x,t)$ ) that is homogeneous and isotropic.
- **Operator**: We define the operator mathematically, e.g., as a differential operator or a transformation matrix.
- **Tensor Representation**: We use tensors to represent forces and moments. For example:
  - In Domain 1: ( $F_i$ ) (force vector).
  - In Domain 2: ( $M_{ij}$ ) (moment tensor).
- We combine these into a six-dimensional wrench tensor ( $W = [F, M]$ ).

3. **Equations of Motion**

   - We can derive equations governing the dynamics of the energy field in both domains. and
   - Incorporate the wrench tensor into these equations to model its effects on spacetime.

4. **Spacetime Deformation**

   - We use Einstein's field equations as a starting point: [ $G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$ ]
     - We extend ( $T_{\mu\nu}$ ) to include the wrench tensor and .

     - Explore how the wrench function modifies spacetime curvature.

   The Gravity Tensor will consist of both real and imaginary terms in its construct. We will see how we can mix its actions in the two domains.

   1. **Real Parts in Domain 1**:
      - This domain, dealing with tangible matter and classical interactions, naturally focuses on the real components of the tensor. These components represent the attractive gravitational force we are familiar with, akin to Newtonian gravity.

      - In this domain, neglecting the imaginary terms simplifies the tensor to align with classical mechanics, ensuring consistency and clarity.

   2. **Imaginary Parts in Domain 2**:

      - Here, spacetime and intangible matter come into play. The inclusion of imaginary components, prefixed with (i), introduces the twist and deformation aspects of gravity. This is a novel way to encode the rotational or wrench action we describe.

      - The intensity of gravity, influenced by the mass of nearby bodies, could determine the magnitude of these imaginary terms. This ties spacetime deformation directly to gravitational strength, echoing concepts in general relativity but with our unique tensorial interpretation.

   3. **The Mix of Real and Imaginary Terms**:

      - Mathematically, such a tensor could resemble a complex-valued construct, where each element comprises real and

imaginary parts. For example: [ G_{ij} = F_{ij} + i M_{ij} ] Here, (F_{ij}) represents the force components, and (M_{ij}) the moments or twisting actions.

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7. **Application Across Domains**:

  - In Domain 1, computations would primarily focus on the ($F_{ij}$) components (the real part), ensuring a classical gravitational description.
  - In Domain 2, ($M_{ij}$) (the imaginary components) could govern spacetime curvature or torsion, connecting mass and deformation through the wrench function. This resonates with your vision of twisting or reshaping spacetime.

8. **Dependence on Mass and Intensity**:
  - Our insight that the deformation or twist depends on the intensity of gravity and the mass of interacting bodies aligns well with physical principles. In fact, mass serves as the source term in general relativity, dictating spacetime curvature.

Let's design a small-scale scenario to validate our framework. Here's an outline to guide the process:

Step 1:**We Choose a Simple System**

We select a basic two-body gravitational system for this test:

- Body A: A large mass (e.g., a star or a planet).
- Body B: A smaller mass (e.g., a moon or an asteroid).

This setup will allow us to explore both the attractive force in Domain 1 and the wrench-like deformation in Domain 2.

**Step 2: Let us Define the Gravity Tensor**

We represent the gravitational interaction using a complex six-dimensional tensor: $$G = \begin{bmatrix} F_x + iM_x \\ F_y + iM_y \\ F_z + iM_z \end{bmatrix},$$ where:

- ($F_x$, $F_y$, $F_z$): Real components representing the gravitational force in three dimensions (Domain 1).
- ($M_x$, $M_y$, $M_z$): Imaginary components representing the moments or twist in three dimensions (Domain 2).

For simplicity, we assume:

- ($F$) (gravitational force) follows the classical law: ( $F = \frac{Gm_1m_2}{r^2}$ ), where ($r$) is the distance between the bodies.

- (M) (moment components) could be modelled as proportional to the intensity of (F) and influenced by the orientation of Body B relative to Body A. For example: [ M_i \propto F \cdot \sin(\theta_i), ] where (\theta_i) represents the angles describing the relative position of Body B.

**Step 3: Domain-Specific Calculations**

1. **Domain 1**:
    - We negglect (M_x, M_y, M_z), and focus solely on the real components (F_x, F_y, F_z).

    - We calculate the gravitational force vector and validate it with Newtonian mechanics.

2. **Domain 2**:

    - We incorporate (M_x, M_y, M_z) and explore how these imaginary terms affect spacetime deformation.

    - We introduce a "twist factor" or deformation metric derived from the magnitude of (M), e.g., ( T = M ).

**Step 4**: **Numerical Simulation**

We simulate the system to visualize the effects and then:

- Plot the gravitational force (F) in Domain 1.

- Visualize the wrench action or twist (M) in Domain 2. A 3D vector field might be useful for illustrating these effects.

We can use Python with libraries like NumPy and Matplotlib or software like MATLAB .

This is the thought experiment we have conducted to validate our hypothesis.

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